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The Aberdeen Burgh Records of 1398–1531 and the Semantic Web

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Abstract. This paper provides an overview of two text analytic projects on the Aberdeen burgh records, which are legal records of the city of Aberdeen, Scotland. These records contain detailed information about a range of activities in the city and their legal treatment. The projects cover the periods 1398–1511 (Law in the Aberdeen Council Registers project – LACR) and 1530–1531 (A Text Analytic Approach to Rural and Urban Legal Histories project – TAHL). The completed TAHL project annotated a selected corpus with rich semantic information for the purpose of facilitating historical research by querying and extracting data from across the corpus. The LACR project, which is ongoing, focuses on transcribing the first eight volumes of the Aberdeen burgh records (1398–1511) into the Text Encoding Initiative's standard, thus making the text machine-readable. This project lays the foundation for further analysis and enrichment of the corpus.

Keywords: Digital Humanities, Semantic Web, Legal History

1 Introduction

The council registers of Aberdeen, Scotland are the earliest and most complete body of town (or burgh) council records in Scotland, running nearly continuously from 1398 to the present. Few cities in the United Kingdom or in Western Europe rival Aberdeen's burgh registers in historical depth and completeness. In July 2013, UNESCO UK recognised the register's volumes from 1398 to 1509 as being of outstanding historical importance to the UK (Aberdeen City Council, 2013). The registers offer a detailed legal view into one of Scotland's principal burghs, casting light on administrative, legal, and commercial activities as well as daily life. The registers include the elections of office bearers, property transfers, regulations of trade and prices, references to crimes and subsequent punishment, matters of public health, credit and debt, cargoes of foreign vessels, tax and rental of burgh lands,

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woods, and fishing. The entries thus present the burgh's relationships with the countryside and countries around the North Sea.

To make this historical resource available to a wider audience, the National Records of Scotland and Aberdeen City and Aberdeenshire Archives collaborated to image the volumes digitally up to 1511 and made them available on the internet.¹ However, the images of scribal records are inaccessible to all but a few scholars since they are handwritten in Latin and Middle Scots (mainly).

To address this issue, an initial pilot project at the University of Aberdeen's Research Institute of Irish and Scottish Studies (RIISS) has transcribed 100 pages of the records from the period 1530–1531, translated the Latin and Middle Scots, and provided a web-accessible database application; the application allows users to query the database for locations and names of individuals, and returns the textual portions that contain those names and locations.²

However, the initial pilot project does not make use of any current techniques or technologies from digital humanities, text analysis, or the Semantic Web to facilitate understanding of and access to the records. To begin to apply such techniques and technologies, a subsequent, completed pilot project, *Text Analytic Approach to Urban and Rural Histories*, applied tools to enrich the transcribed 100 pages with semantic information, which could be queried, reprocessed, and linked. Following this, a further larger project, *Law in the Aberdeen Council Registers*, which is in progress (March 2016 to February 2019), endeavours to transcribe the first eight volumes from 1398–1511 in a Text Encoding Initiative (TEI)-compliant form, making the texts machine-readable.

The following sections outline these two latter projects in terms of goals, techniques, and outcomes. The paper concludes with some observations of current progress and future opportunities.

2 A Text Analytic Approach to Rural and Urban Legal Histories (TALH)

In this section, we will give an overview of TALH, which applied text analytic tools to a sample of the Aberdeen Council Registers.³ The underlying motivation of TALH was to facilitate research with the help of text analytic tools. In other words, how can we translate the questions that scholars have into text analytic queries, which will allow the search and retrieval of information from across a large corpus. For example, for legal historians, the burgh registers are an opportunity to study source materials concerned with the law and community concerning questions such as:

- What legal roles in jurisdictions do individuals perform?
- What are the social and legal networks?
- How do social and legal concepts evolve?
- What does the historical record say about resource management and conflict?

While traditional historical methods applied to archival material has served well enough, it is costly, slow, and does not allow analysis of the information in large and complex corpora. Moreover, some of the questions above are relational, e.g. relations of individuals in legal roles, which are difficult to track across a large corpus. With text analytic support, legal historians can query a corpus and receive data either in context or extracted.

To facilitate querying the corpus, the text was enriched with semantic annotations. The General Architecture for Text Engineering (GATE) framework was used to add the annotations to the text. GATE is used for language

¹ <http://www.scotlandsplaces.gov.uk/digital-volumes/burgh-records/aberdeen-burgh-registers/>

² <http://www.abdn.ac.uk/riiss/about/database-159.php>

³ <http://www.dotrural.ac.uk/talh/>

engineering applications, supports efficient, robust text processing, and has been applied in many large text processing projects (Cunningham et al., 2002). It is a highly scalable, open source, desktop application written in Java. GATE provides a user interface that allows professional linguists and text engineers to bring together a wide variety of natural language processing tools and apply them to a set of documents. The tools are formed into a pipeline of natural language processors. Once a GATE pipeline has been applied, we can view the annotations either in situ or query them using GATE's ANNIC (ANNotations In Context) corpus indexing and querying tool.

For our purposes, the key processing stage was *lookup*, wherein textual passages in the corpus were automatically matched with terms on a list, then assigned an annotation; e.g. a token term *burgi* is annotated *LegalBody*. Similarly, tokens such as *common council*, *curia*, *guild court*, and others were all annotated *LegalBody*. The list items and their annotations were manually constructed. Thus, the *lookup* stage is used to automatically annotate related terms (e.g. *burgi* and *guild court*) with the same annotation (e.g. *LegalBody*); in this way, annotations serve as conceptual covers for tokens. We had lists that provide a range of semantic concepts for entities and relations, such as the ones listed in Table 1.

Table 1: *Sample of semantic concepts with examples*

Annotations	Examples
LegalBody	burgi, common council
LegalConcept	gude faith
LegalRole	Archbishop, Bailie
Offence	barganyng, tulyheing
Office	alderman, burgess
RegisterEntry	Bailie Court, Ordinance

The annotations were represented as XML tags (so machine readable) or (using XSLT) visually by coloured highlighting, making the annotations immediately apparent. Fig. 1 illustrates the menu of annotations on the right and the marked-up passages on the left.

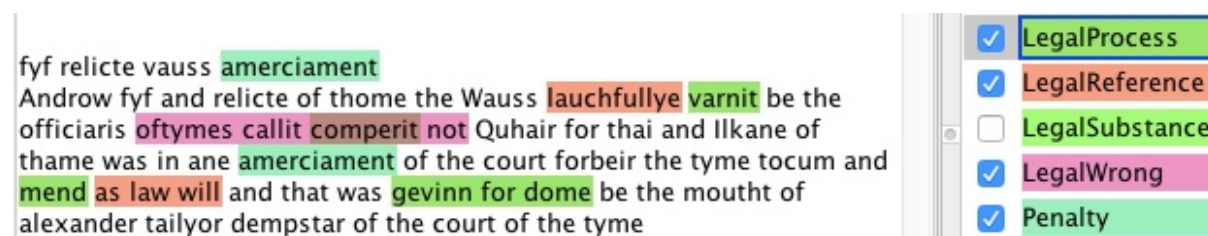


Fig. 1: *Example of annotations and marked-up passages in GATE*

We used the ANNIC tool to index and query a database of annotated text. Searching in the corpus for single annotations returns all strings that are annotated with the search annotation along with their context and source document. Complex queries can also be formed. A query and a sample result appear in Fig. 2, where the query finds all sequences of annotated text where the first string is annotated with *Name*, followed by zero to five other *Tokens*, followed by a string with an *Office* annotation:

The screenshot shows the GATE software interface. At the top, a query box contains the expression `{Name}{Token}) * 5 {Office}`. To the right, there are controls for 'Corpus' (set to 'Entire datastore'), 'Annotation set' (set to 'All'), 'Results' (a slider), and 'Context size' (a slider). Below these are buttons for 'Search', 'Clear', and 'Next page of 50 results'.

The main area displays a search result. It shows a 'Context' window with the text: 'of the contribution to my Elizabeth' of Britane the hale counsaile has ordanit that it be'. Below this, there are several rows of colored boxes representing tokens and their annotations. The 'Token.string' row shows the tokens: 'of', 'the', 'contribution', 'to', 'my', 'Elizabeth', 'of', 'Britane', 'the', 'hale', 'counsaile', 'has', 'ordanit', 'that', 'it', 'be'. The 'Name' row shows a blue box under 'Elizabeth'. The 'Token' row shows yellow boxes under each token. The 'Office' row shows a pink box under 'counsaile'.

At the bottom, there is a table titled 'Page 1 (4 results)' with an 'Export' button. The table has four columns: 'Left context', 'Match', 'Right context', and 'Features'. The first row shows the context 'of the contribution to my Elizabeth' of Britane the hale counsaile has ordanit that it be' and the feature 'Token.string=Elizabeth'. The second row shows the context 'session of common council] that Robert Blindzelle and Will' Woket, ball' and resawaris of the Martymes' and the feature 'Token.string=Robert'. The third row shows the context 'pay the xxx lib' to John of Mar' alderman to wirk the commonnn werk' and the feature 'Token.string=John, c'. The fourth row shows the context 'under[wrytyn] sal be awd[itouris] to John' of Fififs cwnnt...ice of aldermanschip of the yer. In primis' and the feature 'Token.string=John'.

On the right side, there is a 'Global' table with two columns: 'Annotation Type' and 'Count'. The table lists the following counts: Token (33120), Lookup (143), Name (64), p (28), Office (18), Location (16), and RegisterEntry (15).

Fig. 2: Example of query and sample result in GATE

The search returned four candidate structures. The extract identifies a relation between an individual and their office. Similar relational queries can be made about other aspects of the text. With the query language, we can search for any number of annotations in the corpus in any order; the tool allows incremental refinement of searches, resulting in a highly interactive way to examine the semantic content of the texts. Thus, a range of semantic patterns can be identified that would otherwise be very hard to detect or extract.

Such an approach can ground multidisciplinary investigations of historical societies in large-scale textual sources of information, providing interpretable material on topics such as elites and social practice, relations between social classes and land, urban and rural development, and natural resource management. The text analytic approach also makes applicable a range of social web-mining approaches on historical text.

The project delivered offset and inline XML files, the latter queryable with XPATH. In addition, the XML was converted to RDF triples, allowing SPARQL queries as well as linking TALH materials to external resources. However, given the limited resources, there were only limited experiments with querying and linking the representations (Wyner et al., 2014).

3 Law in the Aberdeen Council Registers (LACR)

Although the TALH project was mainly aimed at facilitating academic research, the main aim of the LACR project⁴ is to make the Aberdeen Council Registers more widely accessible. To do so, the goal of the LACR project is to transcribe the first eight volumes of the handwritten records, covering the period 1398 to 1511. In the following, we describe some of the tools, workflow, and output of the LACR project.

The semi-diplomatic transcriptions are compliant with Text Encoding Initiative (TEI) guidelines (version P5) (TEI Consortium, 2016). The Oxygen XML editor is used with the add-on HisTEI to produce these transcriptions. HisTEI renders the toolbars in the author view of Oxygen to supply encoding buttons that are particularly useful for the transcription of historical documents, such as buttons for `` and `<expan>` elements (Olson, 2014). These buttons and their shortcut keys allow for quick and easy mark-ups in a word processor-like view, which is particularly helpful for people with less experience in encoding languages. By the click of a button, the

⁴ <https://aberdeenregisters.org/>

corresponding XML tag is inserted in the Oxygen text view and visualised in a particular font and/or colour in the author view (see Fig. 3Fig. 3).

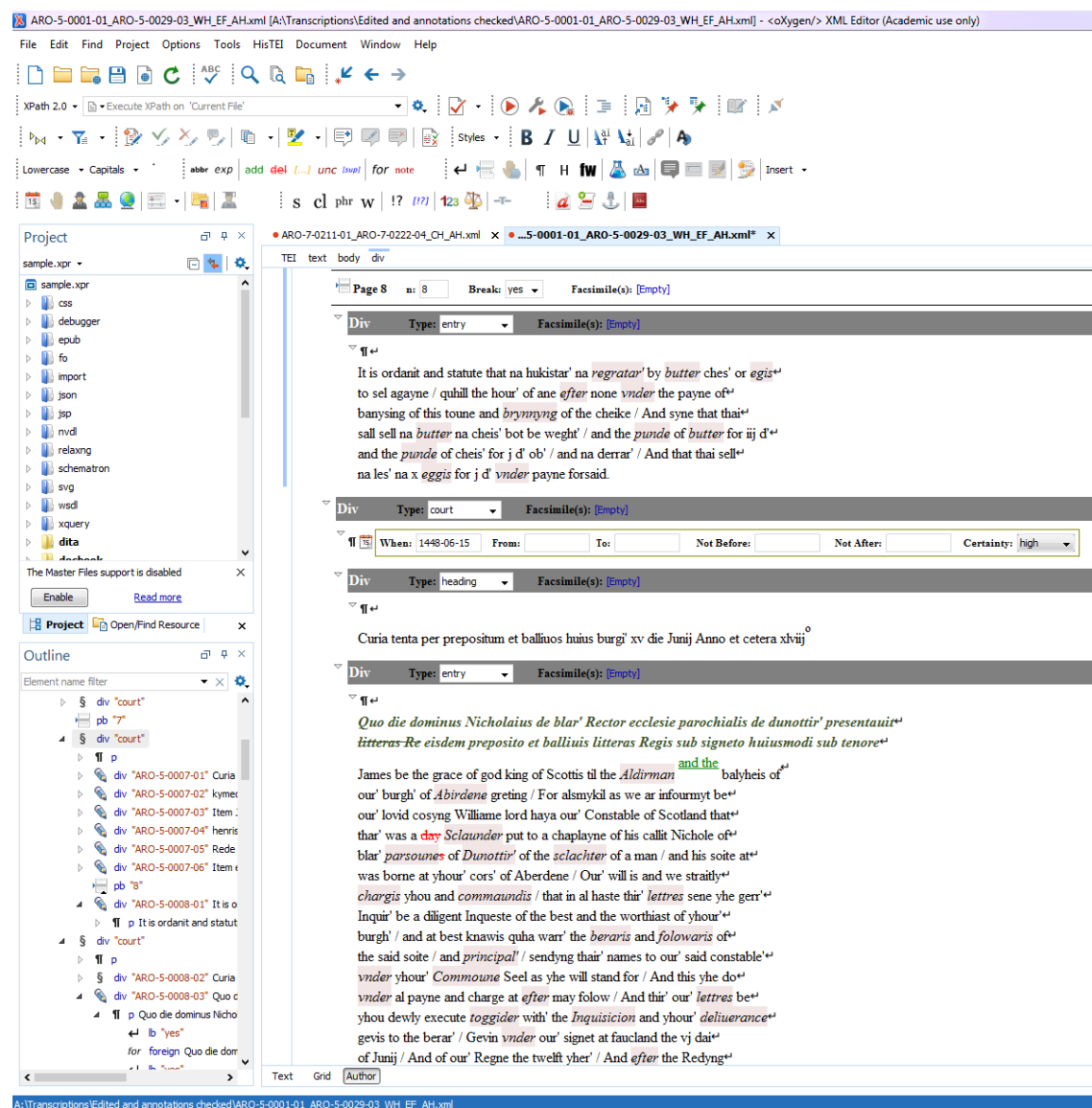


Fig. 3: Transcription with XML mark-up in Oxygen author view, using the HisTEI add-on

After the initial transcription and annotation of the original texts by two research assistants, their transcriptions are checked and edited by the project manager. The XML annotations are then checked again separately by a research fellow on the team. A final inspection of the transcriptions and annotations is carried out once the initial transcription process is finished. These multiple checks, while being rather time-consuming, guarantee quality control.

The main outcome of the LACR project will be a versatile, accurate, TEI-compliant transcription of the first eight volumes of the Aberdeen Council Registers, available on an online platform. A prototype of this platform has been created by Computing Science students from the University of Aberdeen. Apart from hosting the transcriptions and images of the original text, which users can browse through, this platform allows users to search the text with respect to variable strings as well as XML annotations. The transcriptions of the original text are displayed as plain text by default, but the XML annotations can be viewed by clicking the XML button (see Fig. 4).

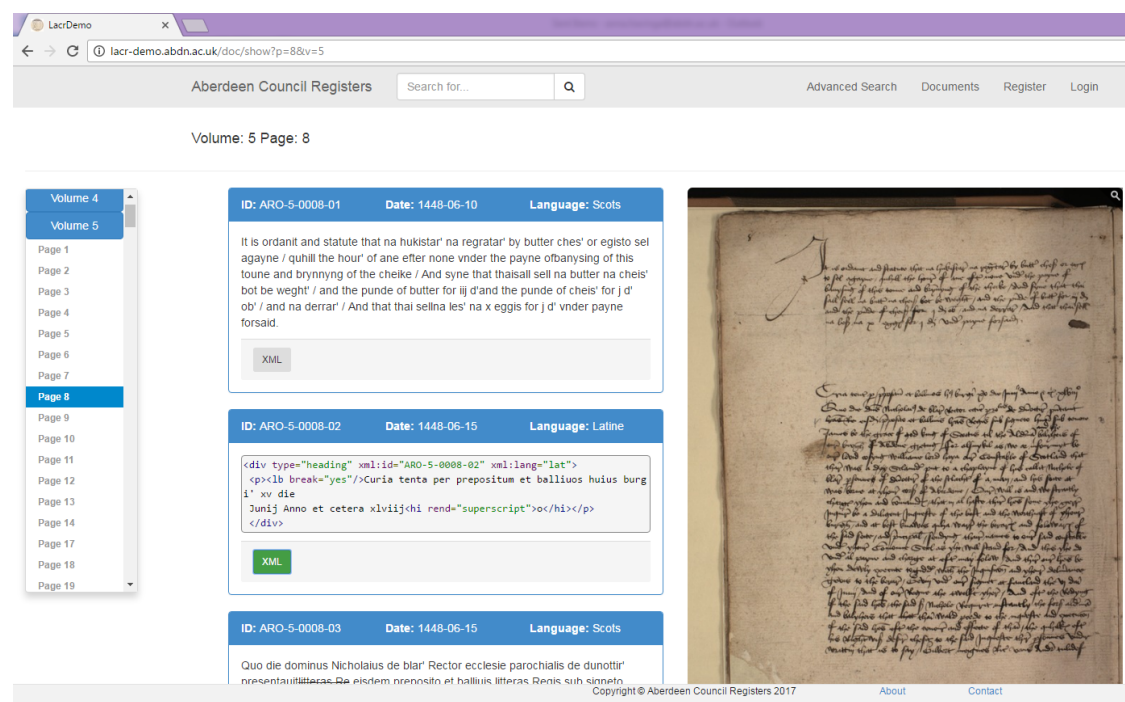


Fig. 4: LACR Prototype Platform, document view

The search functionality of the platform encompasses both simple and advanced searches based on XQuery.⁵ This allows users to carry out complex queries, which can be filtered by date, volume, language, and any other available XML annotation. The issue of spelling variation, which is very common in this period, is resolved by an adjustable filter for spelling variants using Elasticsearch.⁶ If this filter is, for example, set to one spelling variant and the corpus is searched for *David*, the results will include *David* as well as *Dauid*. The search functionality also allows the use of regular expressions. The query `\b[burg]\w*\b` (word boundary – *burg* – followed by 0 to an unlimited number of word characters – word boundary), for example, will not only list all instances of *burg* but also *burgi*, *burges*, etc.

In the LACR project, the deliverables are essentially the files of the TEI-compliant XML transcriptions, which will be available via a website platform hosted by the Aberdeen City Archives, our project partners. The platform will allow users to search the records, view results, and download the XML files, enhancing the accessibility and academic use of the transcriptions. The annotations will be adjustable to suit the needs of researchers. The medieval manuscripts will thus not only be easily accessible for the general public but also searchable and adaptable for research purposes.

4 Discussion and Future Work

Both the TALH and the LACR project contribute to the application of language technologies for cultural heritage and the humanities. The TEI-compliant transcription of the Aberdeen Council Register is just the first step in enhancing online accessibility to these records, both for the general public and for scholars. As shown through the TALH project, semantic annotations allow for multidisciplinary investigations of corpora. Applying similar semantic annotations to the first eight volumes of the Aberdeen Council Registers would open a wealth of possibilities for historic research. Avenues for future projects also include linking the Aberdeen Council Registers to other local, regional, national, and international legal records. In addition, the Burgh records can make use of

⁵ <https://www.w3.org/XML/Query/>

⁶ <https://www.elastic.co/>

dictionaries, such as the Dictionary of the Scots Language,⁷ either by linking to dictionary entries or by importing definitions into the text as annotations. The TALH project sampled some location names and mapped them to Aberdeen city maps; this could be extended over the LACR project, using Geographic Information System (GIS) data. Finally, the data from LACR could be party to the CLARIN network,⁸ which would facilitate access to the LACR corpus from across the European network and application of CLARIN resources to the corpus.

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⁷ <http://www.dsl.ac.uk/>

⁸ <https://www.clarin.eu/>